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## **INTRODUCTION**

Our audit of the Library Department was to include a review of the Department's computerized circulation system. However, because the Department is replacing its computerized circulation system, a comprehensive review of the current system would be superfluous at this time. Instead, we limited our review to the operational continuity of the Department's current circulation system. We reviewed the operational continuity provisions of the current system because they may be indicative of the provisions for the new system now being installed.

## **BACKGROUND**

### **Current Computer System**

In the mid-1970's the City of San Jose contracted with Systems Control, Inc. to create, from scratch, an on-line circulation system for the Library Department. By April 1978, the Main Library and most of the branches had begun on-line circulation. That circulation system used a Digital Equipment Corporation model PDP 11/35 central processor and provided 32 ports (terminal connection points). In 1986, the PDP 11/35 central processor was replaced with a model PDP 11/70 central processor, and the number of available ports was increased to 116. As of December 1988, 95 terminals were connected to the 11/70 system.

## **New Computer System**

The Library Department is in the process of implementing a new on-line circulation system. The new system will include new hardware and software. The new system is a turnkey system which the vendor states has been in use for over 15 years and is used in nearly 1,300 libraries throughout the world. However, the San Jose Library system will be implemented on a hardware configuration different from previous implementations. The system is to be a multi-processor system with 320 ports. The vendor has been working since August 1988, on building and testing the hardware and software to be implemented in San Jose. The new circulation system will not be implemented until the new hardware configuration, together with the new software, has been tested at other libraries. The Library Department expects implementation about May 1989.

There are two reasons for replacing the current computerized system. First, the current system was breaking down frequently, and replacement hardware had become difficult to obtain. Second, computerized library systems with significantly greater operating features (like the on-line public access catalog) had become available.

The new circulation system will be integrated with an on-line public access catalog (OPAC) to be implemented in the Fall of 1989. As a result, the OPAC will show what materials are in the collection, and if the materials are currently available. The OPAC will replace the current card catalogs distributed throughout the Main Library and the branches. Library patrons will be able to query the OPAC from terminals in the Library. It will be possible to make a query from outside the Library using a modem and

telephone lines. The vendor states that the OPAC has been in existence since the mid-1980's.

## **SCOPE AND METHODOLOGY**

Our inquiry into the provisions for the continuity of the Library's computerized circulation system consisted of interviewing Library staff. We subsequently verified certain information obtained during the interviews.

# FINDING

## **CONTINUITY PROVISIONS FOR THE LIBRARY'S NEW COMPUTERIZED CIRCULATION SYSTEM SHOULD BE REVIEWED FOR ADEQUACY AND DOCUMENTED**

General guidelines for computerized systems require provisions to ensure continuity of the computerized operations after the destruction of files or breakdown of hardware. Such provisions include off-site storage of back-up copies of data files and system documentation. Our review revealed that the Library has implemented continuity provisions for its current circulation system. However, we noted that those provisions leave the Library exposed to the risk of losing some circulation data. In addition, the Library may not have the circulation system documentation necessary to efficiently maintain or modify the circulation system's computer programs. Those risks could be perpetuated if a similar pattern is replicated for the new circulation system. Accordingly, the Library should review for adequacy the continuity provisions for its new computerized circulation system and document the resulting provisions.

### **General Guidelines**

General guidelines<sup>1</sup> for the continuity provisions of computerized systems include the following:

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<sup>1</sup> Sources for our general guidelines include:  
Computer Control Guidelines, Canadian Institute of Chartered Accountants, Toronto, Canada, 1970.  
Control Objectives, EDP Auditors Foundation, Inc., Carol Stream, Illinois, 1983.

- Storing back-up copies of data files in a secure, off-site location. This practice protects the back-up files from destruction by the same catastrophe that destroyed the files at the computer site.
- Producing a machine-readable log of transactions posted to the data files. This practice provides the activity information necessary for updating back-up data files to fully reconstruct any files destroyed.
- Maintaining updated copies of the system documentation at a secure, off-site location. This practice protects against a single catastrophe destroying the only copy of the system documentation.

### **Concepts That Have Influenced Continuity Provisions**

The Library has been using the SCI circulation system for over ten years. Discussions with Library personnel identified the following concepts that have had a major influence on the current status of continuity provisions for the SCI circulation system:

- Cost/benefit or operational speed considerations.
- A Library management decision that the Library could tolerate the loss of up to one day's updates to the circulation system's data files.
- The current SCI system's hardware is so out-dated that, in the event it is destroyed in a major catastrophe, obtaining exact replacement equipment would likely be impossible. Consequently, should the current hardware be destroyed, the current SCI system's computer programs would have to be modified to accommodate the different replacement hardware. This would be a time consuming process that would, by definition, preclude continuity.

It should be noted that the last issue, regarding outdated hardware, will not apply to the Library's new system. However, the Library's undocumented policy regarding the loss of one day's circulation information may still apply to the new system. Accordingly, in our opinion, the Library should review its policy regarding information loss within the context of its new system and document the resulting decision. Further, the Library should consider the possibility of establishing information loss tolerance levels for both minor destruction and major catastrophes.

### **Current Contingency Provisions**

Currently, the Library makes back-up copies of both the system and data files at the end of each day the Library is open. However, back-up files for only two of the seven days of the week are stored at the off-site location. The back-up file copies for the other five days of the week are stored in the Library's computer room. As such, these files could be destroyed by the same event that destroyed the files mounted on the computer. If all the on-site copies of the files were destroyed, the off-site back-up copy could be as much as five days old.

The Library uses a City Hall location for off-site storage of back-up files. Library staff transport the files between the Library and City Hall. In our opinion, the Library should consider using a vendor who has specially prepared storage and transportation facilities.

Further, the nightly back-up files cannot be updated to fully reconstruct a destroyed file. This is because those transactions that were entered into the computer system since the last backup copy was made are

not recorded onto a machine-readable transaction log. As a result, it is not possible to reconstruct files by using the transaction log to update the back-up file. The Library informed us that some update transactions are originally input from magnetic media and that these transactions could be used to update backup files. However, the check-in and check-out transactions entered from terminals throughout the Library system are not captured on a transaction log in a machine readable format. Accordingly it is not possible to update the back-up files from a machine-readable transaction log for books checked-in or checked-out.

Finally, certain portions of the documentation for the computerized circulation system have not been kept current. The Library does have current documentation for the users manuals, computer program source code, and computer operator instructions for running the system on the computer. However, the documentation for individual computer programs is considered out-of-date. Also, the only copies of that program documentation are stored at the Main Library. Thus, the copies are susceptible to loss should a catastrophe occur at the Main Library. At the system level, no documentation exists. System level documentation contains the overview of the whole system which provides an understanding of the relationship of the individual computer programs to the whole system. System level and program level documentation are important to facilitate modifying or maintaining a computerized system, including recovering from a catastrophe. In our opinion, the Library should have complete and current documentation and consider placing at least one copy in a secure location. A vendor who has specially prepared storage facilities should be considered as an off-site storage option.



## **Disaster Recovery Plan**

General guidelines for the continuity provisions of computerized systems include the preparation of a documented disaster recovery plan. Such a document states what actions should be taken if a major hardware or software failure occurs or facilities are temporarily or permanently destroyed. This can be especially useful in the event of a major catastrophe which could make the regular computer operations staff unavailable. Accordingly, it is appropriate that an updated copy of the disaster recovery plan be stored in a secure, off-site location. In our opinion, the Library should prepare a disaster recovery plan for its new circulation system and keep an updated copy of that plan in a secure, off-site location.

## **CONCLUSION**

The Library's continuity provisions for its computerized circulation system essentially protect it against those risks resulting from minor processing errors or minor destruction of records. However, those continuity provisions do not protect the Library against risks resulting from major destruction of files or hardware breakdown. As a result, Library management should determine what continuity provisions are appropriate in the environment of its new circulation system.

## **RECOMMENDATIONS**

We recommend that the Library Department:

### **Recommendation #1:**

Determine what level of data loss would be tolerable in its new computerized circulation system. The Department should document the acceptable tolerance level and the major considerations that influenced its decision. Consideration should be given to establishing loss tolerance levels for both minor destruction and a major catastrophe. (Priority 2)

### **Recommendation #2:**

Consider using a vendor with specially prepared storage and transportation facilities that could provide more security for the off-site storage of data file back-up copies and copies of documentation for the computer processes the Library uses. (Priority 2)

**Recommendation #3:**

Determine the need for back-up copies of the new circulation system's data and/or transaction files together with the required protective handling of any such copies. (Priority 3)

**Recommendation #4:**

For the new circulation system, determine 1) how many copies of the various levels of documentation are needed, 2) how they will be kept current, and 3) how they will be protected. (Priority 3)

**Recommendation #5:**

Prepare a disaster recovery plan for the new computerized circulation system, and keep an updated copy of that plan in a secure, off-site location. (Priority 3)

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